

DATA SHEET

For a complete data sheet, please also download:

- The IC04 LOCMOS HE4000B Logic Family Specifications HEF, HEC
- The IC04 LOCMOS HE4000B Logic Package Outlines/Information HEF, HEC

HEF4512B

MSI

8-input multiplexer with 3-state output

Product specification
File under Integrated Circuits, IC04

January 1995

8-input multiplexer with 3-state output

HEF4512B MSI

DESCRIPTION

The HEF4512B is an 8-input multiplexer with 8 binary inputs (I_0 to I_7), an enable input (\bar{E}) and an output enable input (\bar{EO}). One of eight binary inputs is selected by select inputs S_0 , S_1 and S_2 , and is routed to the output O . A HIGH on \bar{EO} causes O to assume a high impedance OFF-state, regardless of other input conditions. This allows the output

to interface directly with bus oriented systems (3-state). When the active LOW enable (\bar{E}) is HIGH, it forces the output LOW provided \bar{EO} is LOW. By proper manipulation of the inputs, the device can provide any logic functions of four variables. It cannot be used to multiplex analogue signals.

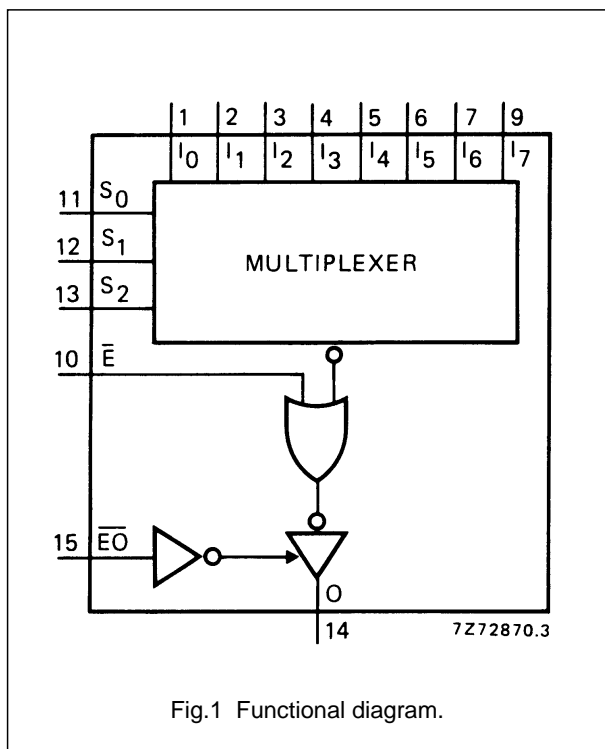


Fig.1 Functional diagram.

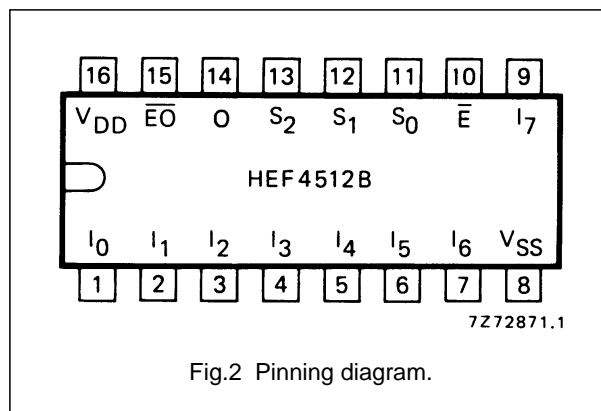


Fig.2 Pinning diagram.

PINNING

- S_0, S_1, S_2 select inputs
- \bar{EO} output enable (active LOW)
- \bar{E} enable (active LOW)
- I_0 to I_7 multiplexer inputs
- O multiplexer output

FAMILY DATA, I_{DD} LIMITS category MSI

See Family Specifications

- HEF4512BP(N): 16-lead DIL; plastic (SOT38-1)
- HEF4512BD(F): 16-lead DIL; ceramic (cerdip) (SOT74)
- HEF4512BT(D): 16-lead SO; plastic (SOT109-1)
- (): Package Designator North America

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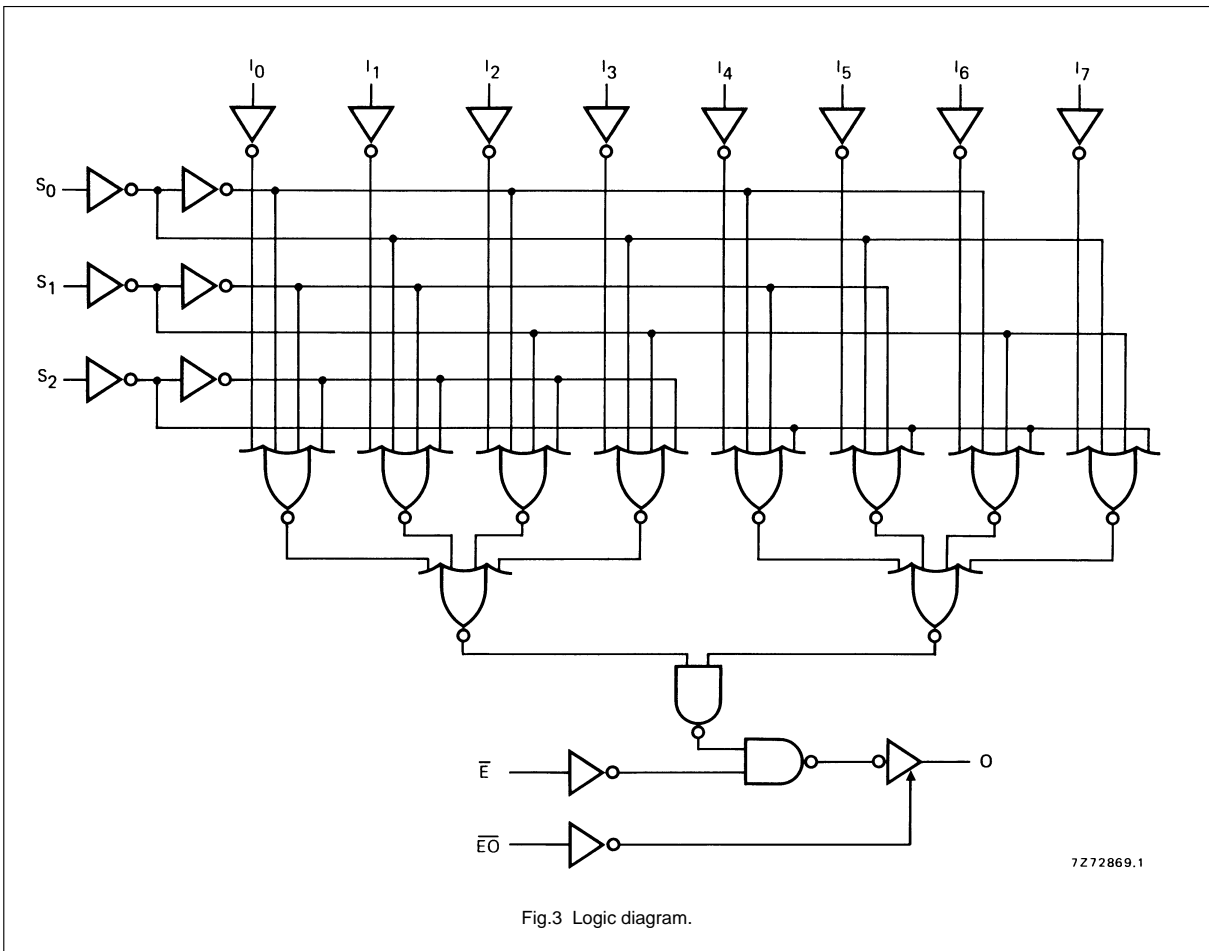


Fig.3 Logic diagram.

8-input multiplexer with 3-state output

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TRUTH TABLE

INPUTS													OUTPUT
\overline{EO}	\overline{E}	S_2	S_1	S_0	I_0	I_1	I_2	I_3	I_4	I_5	I_6	I_7	O
L	H	X	X	X	X	X	X	X	X	X	X	X	L
L	L	L	L	L	L	X	X	X	X	X	X	X	L
L	L	L	L	L	H	X	X	X	X	X	X	X	H
L	L	L	L	H	X	L	X	X	X	X	X	X	L
L	L	L	L	H	X	H	X	X	X	X	X	X	H
L	L	L	H	L	X	X	L	X	X	X	X	X	L
L	L	L	H	L	X	X	H	X	X	X	X	X	H
L	L	L	H	H	X	X	X	L	X	X	X	X	L
L	L	L	H	H	X	X	X	H	X	X	X	X	H
L	L	H	L	L	X	X	X	X	L	X	X	X	L
L	L	H	L	L	X	X	X	X	H	X	X	X	H
L	L	H	L	H	X	X	X	X	X	L	X	X	L
L	L	H	L	H	X	X	X	X	X	H	X	X	H
L	L	H	H	L	X	X	X	X	X	X	L	X	L
L	L	H	H	L	X	X	X	X	X	X	H	X	H
L	L	H	H	H	X	X	X	X	X	X	X	L	L
L	L	H	H	H	X	X	X	X	X	X	X	H	H
H	X	X	X	X	X	X	X	X	X	X	X	X	Z

Notes

- H = HIGH state (the more positive voltage)
L = LOW state (the less positive voltage)
X = state is immaterial
Z = high impedance OFF-state

AC CHARACTERISTICS

$V_{SS} = 0$ V; $T_{amb} = 25$ °C; input transition times ≤ 20 ns

	V_{DD} V	TYPICAL FORMULA FOR P (μ W)	
Dynamic power dissipation per package (P)	5 10 15	$500 f_i + \sum (f_o C_L) \times V_{DD}^2$ $2100 f_i + \sum (f_o C_L) \times V_{DD}^2$ $5800 f_i + \sum (f_o C_L) \times V_{DD}^2$	where f_i = input freq. (MHz) f_o = output freq. (MHz) C_L = load capacitance (pF) $\sum (f_o C_L)$ = sum of outputs V_{DD} = supply voltage (V)

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	V_{DD} V	SYMBOL	TYP.	MAX.		TYPICAL EXTRAPOLATION FORMULA
Propagation delays						
$I_n \rightarrow O$ HIGH to LOW	5	t_{PHL}	100	200	ns	$73\text{ ns} + (0,55\text{ ns/pF}) C_L$
	10		40	80	ns	$29\text{ ns} + (0,23\text{ ns/pF}) C_L$
	15		30	60	ns	$22\text{ ns} + (0,16\text{ ns/pF}) C_L$
LOW to HIGH	5	t_{PLH}	100	200	ns	$73\text{ ns} + (0,55\text{ ns/pF}) C_L$
	10		40	80	ns	$29\text{ ns} + (0,23\text{ ns/pF}) C_L$
	15		30	60	ns	$22\text{ ns} + (0,16\text{ ns/pF}) C_L$
$S_n \rightarrow O$ HIGH to LOW	5	t_{PHL}	140	280	ns	$113\text{ ns} + (0,55\text{ ns/pF}) C_L$
	10		55	110	ns	$44\text{ ns} + (0,23\text{ ns/pF}) C_L$
	15		40	80	ns	$32\text{ ns} + (0,16\text{ ns/pF}) C_L$
LOW to HIGH	5	t_{PLH}	150	300	ns	$123\text{ ns} + (0,55\text{ ns/pF}) C_L$
	10		60	120	ns	$49\text{ ns} + (0,23\text{ ns/pF}) C_L$
	15		40	80	ns	$32\text{ ns} + (0,16\text{ ns/pF}) C_L$
$\bar{E} \rightarrow O$ HIGH to LOW	5	t_{PHL}	60	120	ns	$33\text{ ns} + (0,55\text{ ns/pF}) C_L$
	10		25	50	ns	$14\text{ ns} + (0,23\text{ ns/pF}) C_L$
	15		20	40	ns	$12\text{ ns} + (0,16\text{ ns/pF}) C_L$
LOW to HIGH	5	t_{PLH}	55	110	ns	$28\text{ ns} + (0,55\text{ ns/pF}) C_L$
	10		25	50	ns	$14\text{ ns} + (0,23\text{ ns/pF}) C_L$
	15		20	40	ns	$12\text{ ns} + (0,16\text{ ns/pF}) C_L$
Output transition times						
HIGH to LOW	5	t_{THL}	60	120	ns	$10\text{ ns} + (1,0\text{ ns/pF}) C_L$
	10		30	60	ns	$9\text{ ns} + (0,42\text{ ns/pF}) C_L$
	15		20	40	ns	$6\text{ ns} + (0,28\text{ ns/pF}) C_L$
LOW to HIGH	5	t_{TLH}	60	120	ns	$10\text{ ns} + (1,0\text{ ns/pF}) C_L$
	10		30	60	ns	$9\text{ ns} + (0,42\text{ ns/pF}) C_L$
	15		20	40	ns	$6\text{ ns} + (0,28\text{ ns/pF}) C_L$
3-state propagation delays						
Output disable times						
$\bar{E}O \rightarrow O$ HIGH	5	t_{PHZ}	35	70	ns	
	10		20	40	ns	
	15		15	30	ns	
LOW	5	t_{PLZ}	35	70	ns	
	10		15	30	ns	
	15		10	20	ns	
Output enable times						
$\bar{E}O \rightarrow O$ HIGH	5	t_{PZH}	35	70	ns	
	10		15	30	ns	
	15		10	20	ns	

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	V _{DD} V	SYMBOL	TYP.	MAX.		TYPICAL EXTRAPOLATION FORMULA
LOW	5	t _{pZL}	35	70	ns	
	10		20	40	ns	
	15		15	30	ns	

APPLICATION INFORMATION

Some examples of applications for the HEF4512B are:

- Signal gating
- Digital multiplexing
- Number sequence generation

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TRUTH TABLE for Fig. 4

A ₄	A ₃	A ₂	A ₁	A ₀	INPUT CONN. TO OUTPUT	
L	L	L	L	L	0	via IC 0
L	L	L	L	H	1	
L	L	L	H	L	2	
L	L	L	H	H	3	
L	L	H	L	L	4	
L	L	H	L	H	5	
L	L	H	H	L	6	
L	L	H	H	H	7	
L	H	L	L	L	8	via IC 1
L	H	L	L	H	9	
L	H	L	H	L	10	
L	H	L	H	H	11	
L	H	H	L	L	12	
L	H	H	L	H	13	
L	H	H	H	L	14	
L	H	H	H	H	15	
H	L	L	L	L	16	via IC 2
H	L	L	L	H	17	
H	L	L	H	L	18	
H	L	L	H	H	19	
H	L	H	L	L	20	
H	L	H	L	H	21	
H	L	H	H	L	22	
H	L	H	H	H	23	
H	H	L	L	L	24	via IC 3
H	H	L	L	H	25	
H	H	L	H	L	26	
H	H	L	H	H	27	
H	H	H	L	L	28	
H	H	H	L	H	29	
H	H	H	H	L	30	
H	H	H	H	H	31	

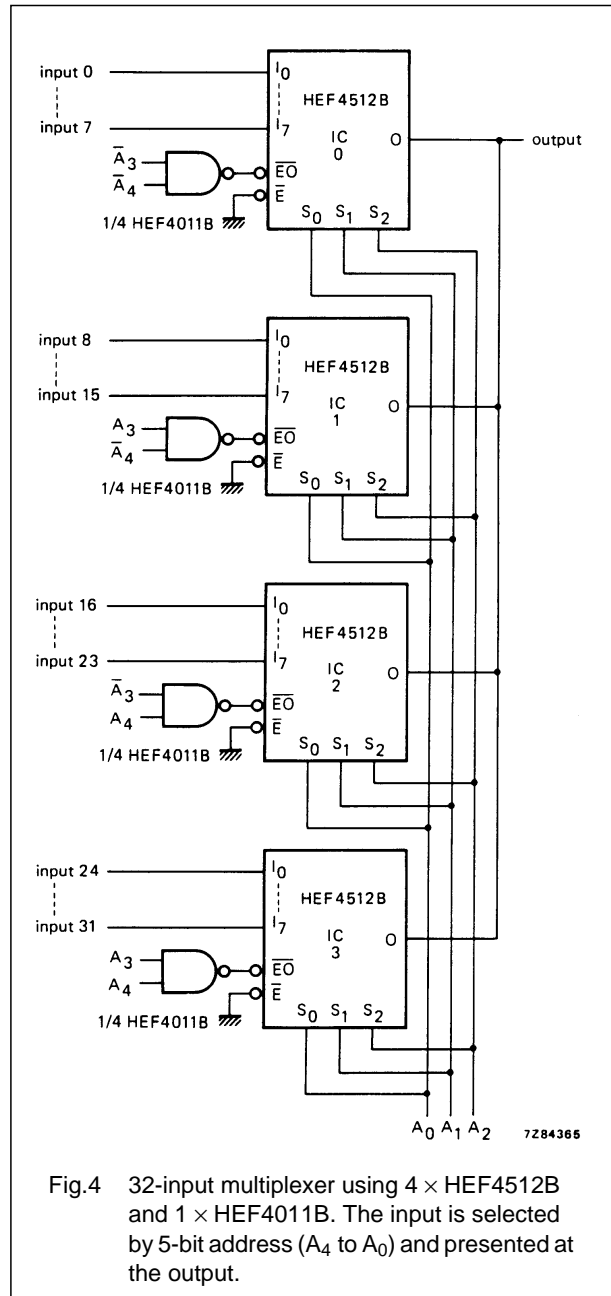


Fig.4 32-input multiplexer using 4 × HEF4512B and 1 × HEF4011B. The input is selected by 5-bit address (A₄ to A₀) and presented at the output.